Facial Approximation

1 Scope

This document describes the procedures for providing anthropological data and imagery generated within the Trace Evidence Unit (TEU) to Visual Information Specialists (VIS) in the Operational Projects Unit (OPU) for the production of facial approximations.

2 Equipment/Materials/Reagents

- Radiography unit (NorthStar X-5000 X-radiography unit or Kubtec radiography unit or equivalent)
- Software for STL production (3-Matic or equivalent)
- Personal protective equipment (e.g., lab coat, gloves, eye protection)

3 Standards and Controls

Not applicable.

4 Sampling or Sample Selection

Not applicable.

5 Procedure

Facial approximations are performed as a joint procedure between a forensic anthropologist and VIS. The following procedures pertain only to the responsibilities of forensic anthropologists.

5.1 Anthropological Examination

Facial approximations will only be performed after an anthropological examination has been conducted. This examination may take place within the TEU, or prior to submission (in which case the evidence must be accompanied by an anthropological report) and includes, at a minimum, biological profile estimation (or portion/s thereof, as applicable) and an assessment of features and/or other information that should be considered for the facial approximation.

5.1.1 Biological Profile Estimation

If the biological profile estimation will be performed in the TEU, the procedures for Forensic Anthropological Examinations and Biological Profile Estimation will be followed. If the

biological profile estimation has been performed previously by an outside anthropologist/agency, this information will be included in the anthropological report.

5.1.2 Assessment of Features for Facial Approximation

The skeletal remains and associated documentation will be assessed for features and/or other information that should be considered for the facial approximation. This may include prominent facial features, antemortem alterations that may affect facial structures, dental information (such as antemortem and postmortem tooth loss), and non-anthropological information from the case documentation (e.g., hair color/length, associated artifacts such as eyeglasses, dentures).

5.2 Skull Imagery

Imagery of the skull (or relevant portions thereof) will be obtained by the forensic anthropologist and transferred to OPU. This imagery may vary depending on the intended final product (i.e., 2-dimensional or 3-dimensional facial approximation) and may include photographs, surface scan files, or stereolithography (STL) files created from computed tomography (CT) scans. Data may be transferred via Forensic Advantage, email, or removable hardware (e.g., CD). This transfer will be documented in the Case Communication Log.

5.2.1 Creation of STL Files from CT Scans

The following steps are used to create an STL file from a CT scan made using the NorthStar system.

1. Open the eFX Reconstruction file (if a previous reconstruction has been performed) or follow the procedures to produce a reconstruction using the Northstar software. On the "Final Setting" screen, set the output volume parameters to 500 microns in the fourth box from the left and then click on "cubical." Click on the "reconstruct" button to perform the reconstruction.
2. Once the reconstruction is completed, create a surface using the "Surface" button on the left-hand toolbar at the default ISO level suggested by the software. If too much background is captured or bone is lost, adjust ISO level as necessary using the ISO input in the surface window.
3. Save the surface as an STL file using the "Save" button on the surface window with the lab number (and item number if applicable) as the file name.
4. Open 3-matic and import the STL file using the "import part" function under the File menu.
5. To eliminate extraneous shells from the STL, use the "mark shell" function to select the main skull shell. Then right click on the "marked triangles" in the upper right window (object tree) and select "separate into new part". Then right click on the original part in the object tree and select "Hide." Re-click on the new part in the object tree to activate the shell.

6. To smooth the STL and minimize the size of the file, select the "wrap" function from the Fix menu and select "apply" using the default parameters in the operations window in the lower right. When complete, right click on the unwrapped item in the object tree and select "Hide." Then click on the wrapped item to activate the wrapped shell.

7. To prepare the STL file for printing, run the "fix wizard" function from the Fix menu. Make sure all items are checked for review and click "Follow advice." Continue clicking "Follow advice" until all items are marked "0" except for "shells," which should be 1, and overlapping triangles, for which it is acceptable to have multiple.

8. Save the STL using the "Export" function in the File menu. Choose the output directory in the operations window (lower right) and save by clicking "apply."

9. Save the entire 3-matic file under the file menu.

5.3 Consultation between Anthropologist and VIS

Following the completion of the facial approximation and prior to its release to the contributor, the forensic anthropologist and VIS will review the facial approximation together to confirm consistency with skeletal features. As appropriate, the facial approximation may be revised until approved by the forensic anthropologists and VIS. This review will be documented in the Case Communication Log.

5.4 Records

5.4.1 Case Notes

The case notes will contain records appropriate to any anthropological examinations conducted (e.g., biological profile, trauma analysis). The case notes will also include the anthropological assessment of features to be considered for the facial approximation.

5.4.2 Reports

The biological profile estimation will be included in the FBI *Laboratory Report* (7-1, 7-1 LIMS). If the biological profile estimation was performed by an outside anthropologist/agency, this will be clarified in the report. For example: "*Incoming documentation indicates the following estimated biological profile:...*"

The FBI *Laboratory Report* (7-1, 7-1 LIMS) will include a summary of features to be considered for the facial approximation. For example: *"Features observed that should be considered for the facial approximation include a large, projecting nose, robust chin, moderately pronounced and V-shaped supraorbital ridge. The missing anterior dentition represents a postmortem loss; the facial approximation should therefore display a closed mouth"*

6 Calculations

Not applicable.

7 Measurement Uncertainty

Not applicable.

8 Limitations

8.1   The conclusions that can be reached from anthropological examinations are dependent on the condition and completeness of the remains, and the availability and quality of antemortem data.

8.2   The production of facial approximations is for investigative purposes and is not a means of identification.

9 Safety

9.1   While working with physical evidence, laboratory personnel will wear at least the minimum appropriate protective attire (e.g., laboratory coat, safety glasses, protective gloves).

9.2   Universal precautions will be followed.

9.3   Exposure to biological and radiological hazards may be associated with the examination techniques performed. Safety procedures related to specific instruments or equipment (e.g., wafering saws, radiography units) will be followed. Refer to the FBI Laboratory Safety Manual for guidance.

10 References

- FBI Laboratory Safety Manual (current version)

- Forensic Anthropological Examinations, Trace Evidence Procedures Manual (current version)

- Biological Profile Estimation, Trace Evidence Procedures Manual (current version)

- ANSI/ASB Best Practice Recommendation 089 Best Practice Recommendation for Facial Approximation in Forensic Anthropology (current version).

- Facial Approximation, Operational Project Unit Procedures Manual (current version)

Rev. #	Issue Date	History
2	02/07/2018	Updated title to reflect change from unit-specific. Updated Section 1, Scope and Section 2. Changed forensic artist to visual information specialist throughout. Added 'or Sample Selection' to Section 4 header. Moved language in former Section 5.4.3 to Section 5.2.1. In Section 5.2.4, added option to use photos or CT scans at discretion of forensic anthropologist and VIS. Updated wording in Section 5.3 for clarity. Section 5.4 header changed to 'Records' and added FBI Laboratory Report instead of report to Sections 5.4.2 and 5.4.3. Section 5.4.4, provided examples of how identification can be made. Removed Section 8.3. Updated references in Section 10.
3	08/16/2021	Updates to entire document to reflect LD reorganization in which forensic artists performing facial approximations are no longer in the TEU. All portions relating to responsibilities of VIS deleted, and greater specificity added regarding anthropological examinations and production of skull imagery. Replaced SWGANTH document with OSAC Best Practice in References. OPU Facial Approximation procedure added to References.

Redact - Signatures on File

Approval

Trace Evidence Unit Chief: Date: 08/13/2021

Anthropology Technical
Leader: Date: 08/13/2021